

# PATENT ABSTRACTS OF JAPAN

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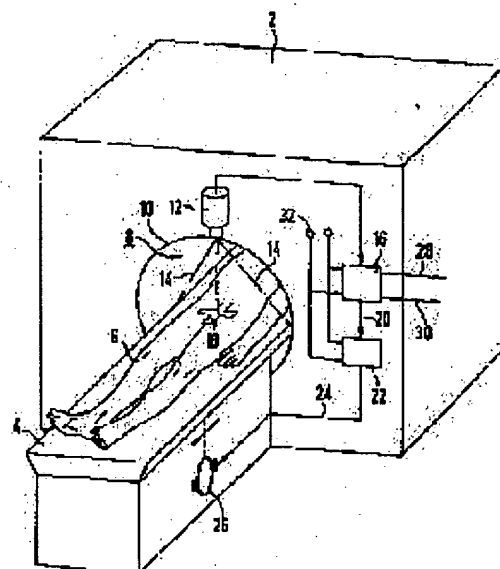
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(54) METHOD AND DEVICE FOR POSITIONING PATIENT IN MEDICAL DIAGNOSTIC DEVICE

(57)Abstract:

**PROBLEM TO BE SOLVED:** To make positioning of a patient surely and rapidly by detecting a transfer distance of a patient bed from a spatial position and a detecting position of a mark with use of a patient bed control part and moving the patient bed along the transfer distance.

**SOLUTION:** An image photographing machine 12 detects a mark 18 on a patient 6 who has been marked at the outside of a detection space 8 as an image. The mark 18 is discriminated within the image. A spatial position of the mark 18 is detected by an image treating unit 16 as an actual positioning signal 20. Then, a transfer distance of a patient bed 4 is detected at a patient bed control part 22 from the spatial position and the detection position of the mark 18. The patient bed control part 22 is made in such a way that the patient bed 4 is moved along the transfer distance. Thereby, a region of the patient 6 to be detected can be positioned surely and rapidly within a detection space.



## LEGAL STATUS

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**CLAIMS**

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**[Claim(s)]**

**[Claim 1]** It is the approach of positioning a patient (6) in medical-application diagnostic equipment (2). In the approach which has a working berth (4) and a patient (6) can move to an inspection location in the inspection space (8) of diagnostic equipment (2) with this working berth (4) An image motion picture camera machine (12) detects as an image the mark (18) attached to the patient (6) outside inspection space (8). An image-processing unit (16) A mark (18) is identified in the aforementioned image and the space position (20) of a mark (18) is detected. The berth control section for patients (22) It is the approach characterized by detecting the migration block distance of the berth for patients (4), and said berth control section for patients (22) moving the berth for patients (4) from said space position (20) and an inspection location along with a migration block distance.

**[Claim 2]** An image-processing unit (16) is the approach according to claim 1 of detecting the orientation of a mark (18) and sending out an orientation signal (30) further.

**[Claim 3]** An image-processing unit (16) is the approach according to claim 1 or 2 of identifying a mark (18) and sending out an identification signal (28) further.

**[Claim 4]** An image-processing unit (16) is the approach of the inside to claims 1-3 which operate by the trigger signal or the acoustical trigger signal by hand control given in 1 term including the berth control section for patients (22).

**[Claim 5]** It has medical-application diagnostic equipment (2). This medical-application diagnostic equipment (2) In the equipment which has the inspection space (8) for photoing at least one part of a patient (6), and a berth for working patients (4) for positioning a patient (6) in an inspection location in inspection space (8) The image motion picture camera machine (12) is spatially attached to the berth for patients (4). The image photography field (14) of an image motion picture camera machine (12) The location of the berth for patients (4) out of inspection space (8) is detected, and the image-processing unit (16) is connected to the image motion picture camera machine (12). An image-processing unit (16) A mark (18) is identified in the image photoed with the image motion picture camera vessel (12), and it is constituted so that the space position (20) of this mark may be detected. The berth control section for patients (22) Equipment which enforces the approach of the inside to claims 1-4 characterized by connecting with an image-processing unit (16) and the berth for patients (4) in order to position the location of a mark (18) in the inspection location in inspection space (8) using the berth for patients (4) given in 1 term.

**[Claim 6]** The image motion picture camera machine (12) is constituted as a VIDEO camera, Equipment according to claim 5.

**[Claim 7]** Trigger equipment (32) is equipment according to claim 5 or 6 connected to the image-processing unit (16) and the berth control section for patients (22) in order to start positioning.

**[Claim 8]** Trigger equipment (32) is equipment according to claim 7 which has a sound transducer for a pushbutton switch or a voice control.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]** This invention is the approach of positioning a patient in medical-application diagnostic equipment, has a working berth and relates to the approach which a patient can move to an inspection location in the inspection space of diagnostic equipment with this working berth.

**[0002]** Similarly, this invention is equipment which enforces the above-mentioned approach, it has medical-application diagnostic equipment and this medical-application diagnostic equipment is related with the equipment which has the inspection space for photoing a patient's at least 1 part, and a berth for working patients for positioning a patient in an inspection location in inspection space.

**[0003]**

**[Description of the Prior Art]** In the case of the medical-application diagnostic equipment of an image display mold, for example, the nuclear-magnetic-resonance equipment for a diagnosis, and an X-ray CT scanner, a tested area must be positioned so that the anatomy of a patient's tested area may be detected in inspection space. In the case of nuclear-magnetic-resonance equipment, especially - inspection space is often surrounded by sealed casing to - photography opening, and positioning is performed using the berth for working patients. The laser projector is prepared in the field of photography opening, and this laser projector projects an optical mark on a patient. Outside inspection space, a patient can put it to sleep, as this optical mark on the front face of a patient's body shows the center section of the inspection zone on the berth for patients. Since the distance of the optical mark to inspection space is known, the migration block distance of the berth for patients into inspection space is obtained. Putting a patient to sleep precisely on the berth for patients on the basis of an optical mark requires time amount, and all inspection durations become very long.

**[0004]** It is necessary to notify supine, that the orientation of the patient on the berth for patients, for example, a patient's head, has turned to the direction of inspection space for some inspection, or whether a patient's guide peg has turned to the direction of inspection space and a patient's posture, for example, proneness, to test equipment.

**[0005]** The approach and equipment for positioning from the German patent No. 3114918 official report with VIDEO optical location detection of the body fixed in space are well-known. The image photoed with the VIDEO camera is digitized. In this digitized image, the coordinate of the marking point by which image formation was carried out is searched for using a threshold operation. The actual location of this marking point is compared with a target position for positioning of the body. The data and information which are used in order to move the body from the result of this comparison to that target position are acquired. In an application, a mark is attached to the ultrasonic measuring head for a medical diagnosis, for example. Consequently, when setting a comparatively long time interval and inspecting it repeatedly, the ultrasonic measuring head by which marking was carried out such can be brought to the same location each time. In this way, the ultrasonic image of this inspection zone that can be compared is created.

**[0006]** Moreover, the VIDEO optical location detecting method relevant to the lithotrite (device which grinds a calculus using a shock wave) from a U.S. Pat. No. 4896673 specification is well-known. The location and orientation of an ultrasonic measuring head are detected by this VIDEO optical location detecting method. The location of a patient's gallstone is checked using the ultrasonic device for a diagnosis, and subsequently, in order to treat, this gallstone is brought to the focus of an impulse wave generator. For that purpose, with an ultrasonic applicator, a tester scans an inspection zone until the gallstone which should be treated is checked by looking in an ultrasonic image. And VIDEO optical localization equipment operates through a foot switch, and the location of an ultrasonic applicator is detected by this equipment. The location of a gallstone is detected from the location of an ultrasonic applicator, and the location of the mark in an ultrasonic image. The migration block distance of the berth for patients is found from the difference of the location of a gallstone, and the location of the focus of an impulse wave.

[0007] The following equipments are indicated by the German utility model 9308917.No. 1. That is, this equipment sends out a display or an alarm signal, if a patient moves from a position. It is especially important for the medical diagnosis or laser therapy using laser to continue taking the posture stabilized by the patient. Otherwise, it will deal with the wrong organ part, or inspection must be redone again. A reflective component is fixed to the part which a patient should inspect or treat. This equipment has a source of laser oscillation, and that laser is turned to the reflective component. Furthermore, light-receiving equipment is formed and the laser with which this light-receiving equipment was reflected by the reflective component is received. This light-receiving equipment is connected to the display and/or the warning device, and when the reflected laser does not return, a display or an alarm signal is sent out. [0008]

[Problem(s) to be Solved by the Invention] The 1st technical problem of this invention is offering the approach of positioning a patient in medical-application diagnostic equipment, and can position a patient's tested area in inspection space certainly and quickly by this approach.

[0009] Furthermore, the 2nd technical problem of this invention is offering the equipment which enforces the above-mentioned approach.

[0010]

[Means for Solving the Problem] The 1st technical problem of the above is the following, and is made and solved. That is, an image motion picture camera machine detects in an image the mark attached to the patient outside inspection space, an image-processing unit identifies the mark in an image, and detects the space position of a mark, the berth control section for patients detects the migration block distance of the berth for patients from the space position and the inspection location of that mark, and the berth control section for patients is solved by moving the berth for patients along with this migration block distance.

[0011] The 2nd technical problem of the above about equipment is the following, and is made and solved. An image motion picture camera machine is spatially attached to the berth for patients. Namely, the image photography field of an image motion picture camera machine The location of the berth for patients out of inspection space is detected, and an image-processing unit is connected to an image motion picture camera machine. An image-processing unit It is prepared so that a mark may be identified in the image photoed with the image motion picture camera vessel and the space position of this mark may be detected. The berth control section for patients In order to move the location of a mark to the inspection location in inspection space using the berth for patients, it is solved by connecting with an image-processing unit and the berth for patients.

[0012]

[Embodiment of the Invention] With the solution means of the 1st technical problem, it becomes unnecessary to position a tested area to the central point of an optical mark precisely over many hours. A patient should just lie on the berth for patients almost optionally.

[0013] In an advantageous operation gestalt, further, an image-processing unit detects the orientation of a mark and sends out a suitable orientation signal. Thereby, it is not necessary to tell medical-application diagnostic equipment about a patient's sense manually any longer.

[0014] In another advantageous operation gestalt, further, an image-processing unit identifies a mark and sends out an identification signal. When a different mark which shows for example, a proneness posture and a supine posture is used by this, a patient lies prone and a posture and a supine posture are distinguished mutually.

[0015] Furthermore in another advantageous operation gestalt, an image-processing unit operates by the trigger signal or the acoustical trigger signal by hand control also including the berth control section for patients.

[0016] An advantageous operation gestalt becomes that in which the image motion picture camera machine was excellent by especially being constituted as a CCD camera as a VIDEO camera.

[0017]

[Example] This invention is explained based on a drawing below. Drawing 1 is illustrating nuclear-magnetic-resonance equipment 2 as medical-application diagnostic equipment roughly. Nuclear-magnetic-resonance equipment 2 is equipped with the berth 4 for working patients, and a patient 6 is moved to an inspection location in the inspection space 8 with this berth 4 for patients. The inspection space 8 is enclosed by casing of nuclear-magnetic-resonance equipment 2 in all the surroundings to the photography opening 10. Here, conventional nuclear-magnetic-resonance equipment 2 is used, and the structure of this nuclear-magnetic-resonance equipment 2 is well-known. Therefore, it does not carry out illustrating the detailed details beyond this in a drawing.

[0018] In the upper part of the photography opening 10, the image motion picture camera machine is being fixed to outer wall casing of nuclear-magnetic-resonance equipment 2 in the form of the VIDEO camera, for example, a CCD camera. When the berth 4 for patients is out of the inspection space 8, this VIDEO camera 12 is adjusted so that that image photography field may detect a patient (demarcated by two alternate long and short dash lines 14) 6.

[0019] This VIDEO camera 12 and the image-processing unit 16 are connected. The mark 18 attached to the patient 6 is identified by this image-processing unit 16, and the space position of this mark 18 can be detected by it. The structure and the function of such an image-processing unit are the conventional technique, for example, are indicated by the German patent No. 3114918 specification or the U.S. Pat. No. 4896673 official report.

[0020] The image-processing unit 16 is the output side, and sends out the actual position signal 20 of a mark 18. This actual position signal 20 is inputted into the berth control section 22 for patients connected to the image-processing unit 16. This berth control section 22 for patients detects the migration block distance of the berth 4 for patients from the target position which actually expresses a location 20 and an inspection location, and sends out the suitable control signal 24 to a servo motor 26, for example, a pulse motor.

[0021] In order for a patient 6 to lie prone and to show whether it is a posture and whether it is a supine posture, when a different mark 18 is used, the image-processing unit 16 identifies the mark, actually adds it to a position signal 20, and sends out the identification signal 28. This identification signal 28 shows a patient's 6 posture. through the mark 18, if it becomes a suitable mark is used, a patient's guide peg is turned to the orientation of the inspection space 8 further again -- or a patient's head is turned to the orientation of the inspection space 8 -- it is shown a thing. In that case, an image-processing unit sends out the suitable orientation signal 30. By nuclear-magnetic-resonance equipment 2, the identification signal 28 and the orientation signal 30 are used, in case predetermined detection method is performed.

[0022] The trigger of the positioning is carried out by the pushbutton switch 32 for a start which can be operated manually. It is also possible to replace the pushbutton switch 32 for a start with a microphone, consequently impaction efficiency can be started with a sound signal.

[0023] It is advantageous that it is outside original measurement space and a mark 18 can already be attached to a patient 6 before inspection. Therefore, precise positioning of a patient's 6 inspection zone still becomes impossible [ a patient 6 ] on the berth 4 for patients in the inspection space 8 of diagnostic equipment 2 that what is necessary is just to lie almost optionally. The process of positioning itself is started by operating the pushbutton switch 32 for a start. The berth control section 22 for patients can move the berth 4 for patients to the inspection location in the inspection space 8 immediately after detection of the actual location 20 of a mark 18.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] The schematic diagram of the nuclear-magnetic-resonance equipment as medical-application diagnostic equipment

[Description of Notations]

2 Nuclear-Magnetic-Resonance Equipment

4 Berth for Patients

6 Patient

8 Inspection Space

10 Photography Opening

12 Image Motion Picture Camera Machine

14 Alternate Long and Short Dash Line (Image Photography Field)

16 Image-Processing Unit

18 Mark

20 It is Actually Position Signal.

22 Berth Control Section for Patients

24 Control Signal

26 Servo Motor

28 Identification Signal

30 Orientation Signal

32 Pushbutton Switch for Start (Trigger Equipment)

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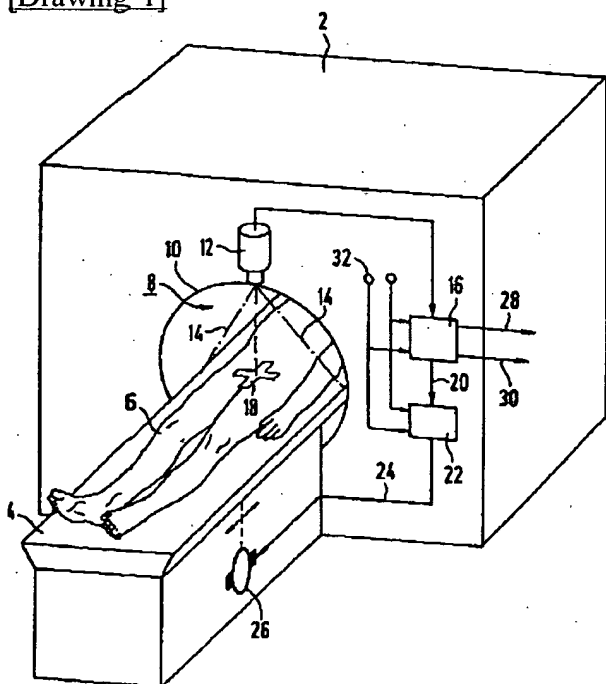
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DRAWINGS

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[Drawing 1]



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